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102. (New) The solid support of claim 101 wherein alkyl is selected from the group consisting of methyl, ethyl, n-propyl, iso-propyl, n-butyl, iso-butyl, and tert-butyl.

103. (New) The solid support of one of claims 97-100 wherein acyl is selected from the group consisting of acetyl, propanoyl, and butanoyl. --

REMARKS

Claims 80-103 are currently pending in this application for the Examiner's review and consideration. Claims 48-79 have been canceled without prejudice, and Applicants reserve the right to prosecute them in one or more continuation, divisional, or continuation-in-part application(s).

Each of new claims 80-103 are fully supported by the specification as filed, and no new matter has been introduced. For example, solid supports comprising cyclic compounds such as those recited by claims 80, 81, 97 and 98 are described in the specification at, *inter alia*, page 13, line 6 - page 14, line 30. Solid supports comprising linear compounds such as those recited by claims 90, 91, 99 and 100 are described at, *inter alia*, page 9, line 35 - page 11, line 5.

The Rejections Under 35 U.S.C. §112 Have Been Obviated

As set forth on pages 2-6 of the Final Office Action, claims 48-79 were rejected under the second paragraph of 35 U.S.C. §112 as allegedly failing to particularly point out and distinctly claim the invention. These rejections have been obviated for the reasons provided below, and are respectfully traversed to the extent they may be applied to any of new claims 80-103.

The bulk of the rejections set forth on pages 2-6 of the Final Office Action are based on the recitation by claims 48-79 of functional language and what are alleged to be process limitations. Although Applicants respectfully disagree with these rejections, claims 48-79 have been canceled and new claims 80-103 have been added to further the prosecution of this application. New claims 80-103 do not recite the majority of the functional language and alleged process limitations objected to. Applicants note, however, that new claims 80, 81, 90, 91, and 97-100 recite R groups which are "an atom or chemical moiety which is inert under the conditions of polynucleotide synthesis on a solid support." Applicants respectfully submit that this one use of functional language does not render the claims indefinite. *See, e.g., Donald S. Chisum, Chisum on Patents* 8.04 (Matthew Bender, 1999) (explaining that "[u]nder the better view today, functional language in claims is not objectionable per se"); see

also *In re Swinehart*, 439 F.2d 210, 212 (C.C.P.A. 1971) (“In our view, there is nothing intrinsically wrong with the use of [functional language] in drafting patent claims. Indeed, we have even recognized in the past the practical *necessity* for the use of functional language” (citation omitted; emphasis in original)).

On page 2 of the Final Office Action, claims 48-79 are objected to for their recitation of the term “universal,” which is allegedly superfluous. Because this term is not recited by any of new claims 80-103, this objection may be withdrawn.

On page 3 of the Final Office Action, claim 48 is rejected for its recitation of the term “comprising” because its use allegedly “implies that the chemical structure of the *compound being claimed* contains additional structural component(s) not defined in the claim.” (Emphasis added). In view of the fact that the term “comprising” is recited by the new independent claims, this rejection is respectfully traversed.

As recited by new claims 80, 81, 90, 91, and 97-100, this invention is directed to a *solid support* which can be used in the solid phase synthesis of polynucleotides. As made clear by these claims, the *solid supports* they recite comprise the specific, unambiguously defined chemical compounds which they recite. However, the specific chemical *compounds* recited by these claims are *not* defined using the term “comprises.” For this reason, Applicants respectfully submit that insofar that it can be applied to any of new claims 80-103, this rejection of claim 48 under §112, second paragraph, should be withdrawn.

On pages 4-5 of the Final Office Action, claims 51, 57, 58, 62, 67-70, and 73-75 are rejected for their recitation of terms such as “halogenated derivatives thereof,” which allegedly encompasses inoperative embodiments of the invention. In view of the fact that the term “halogenated derivatives of alkyl” is recited by new claims 87, 94 and 101, this rejection is respectfully traversed.

Applicants respectfully request that the allegation set forth on page 4 of the Final Office Action (*i.e.*, that α -halo compounds are highly sensitive to hydrolysis) be supported by an affidavit under 37 C.F.R. 1.104(d)(2) should it be used to challenge the validity of any of new claims 80-103. However, it is believed that the alleged sensitivity of α -halo compounds has no bearing on the validity of any of the new claims. This is because the halogenated alkyl groups recited by claims 87, 94 and 101 are not bound to C₁ or C₂ via an oxygen atom as shown on page 4 of the Final Office Action. For this reason, Applicants respectfully submit that insofar that it can be applied to any of new claims 80-103, the rejection of claims 51, 57, 58, 62, 67-70, and 73-75 under §112, second paragraph, should be withdrawn.

On pages 5-6 of the Final Office Action, claims 60 and 71 are rejected as allegedly failing “to specify all of the structural details of the ‘ribose ring’ and the linkage(s) thereof to

the other component parts of the claimed solid support.” This rejection is traversed to the extent it can be applied to new claim 84.

New claim 84 recites a solid support which comprises a specific, unambiguously defined compound wherein C₁ and C₂ respectively form positions 2' and 3' of a ribose ring and wherein Y is the 2' oxygen atom of the ribose ring. Because the ribose structure and the nomenclature used to describe it are well known to those skilled in the art¹, the structural details of the ribose ring recited by claim 84 are clear, and those skilled in the art would have no difficulty in determining how it is attached to the solid support recited by claim 84. For this reason, Applicants respectfully submit that insofar that it can be applied to claim 84, this rejection of claims 60 and 71 under §112, second paragraph, should be withdrawn.

In sum, because of the reasons provided above, and because new claims 80-103 do not recite the functional language and alleged process language of canceled claims 48-79, Applicants respectfully submit that new claims 80-103 particularly point out and distinctly claim the subject matter which they regard as at least a part of the present invention.

Finally, as set forth on pages 6-7 of the Final Office Action, claims 48-79 are rejected under the first paragraph of 35 U.S.C. §112 as allegedly containing subject matter not described in the specification. This rejection is based on “functional limitations which imply a breadth of claim scope which encompasses exemplifications not enabled within the instant disclosure.” Because the bulk of the functional limitations recited by canceled claims 48-79 are not recited by any of new claims 80-103, Applicants respectfully submit that this rejection should be withdrawn.

The Rejections Under 35 U.S.C. §102 Have Been Obviated

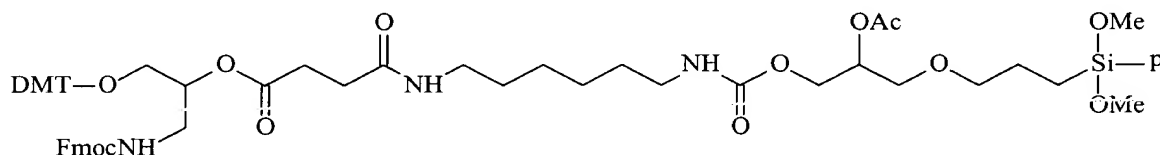
On page 7 of the Final Office Action, claims 48, 50, 52-55, 57-58, 62, 65, 67, 69, 73-76, and 79 are rejected under 35 U.S.C. §102(a) as allegedly being anticipated by Lyttle *et al.*, *Nucleic Acids Res.* 24(14):2793-2798 (1996) (“Lyttle”), and under §102(b) as allegedly being anticipated by Vu *et al.*, *Bioconjugate Chemistry* 5(5):599-606 (1995) (“Vu”). As in the Supplemental Amendment filed June 25, 1999, both of these rejections are traversed in view of the fact that both Lyttle and Vu were published after the priority date of this application (*i.e.*, July 9, 1993). Applicants respectfully remind the Examiner that he acknowledged the unavailability of both Lyttle and Vu as prior art during the prosecution of

¹ See, *e.g.*, Lubert Stryer, *Biochemistry*, p. 86 (4th ed.: W.H. Freeman & Co. 1988).

parent application no. 08/591,466 in the Interview Summary dated October 2, 1997 (paper no. 8).

On page 8 of the Final Office Action, claims 48, 50, 52-55, 57-58, 62, 65, 67, 69, 73-76, and 79 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Nelson *et al.*, *Nucleic Acids Research* 17(18):7187-7194 (1989) ("Nelson"). Applicants respectfully traverse this rejection to the extent that it may be applied to any of new claims 80-103.

Nelson discloses a pore glass "which introduces an aliphatic primary amine to the 3' terminus of an oligonucleotide via solid phase synthesis." Nelson, p. 7187, final paragraph. The structure of the pore glass is disclosed in Figure 1 on page 7188, and is shown below:



Because this structure is clearly a linear one, Nelson does not disclose solid supports which comprise a cyclic compound, such as those recited by new independent claims 80, 81, 97 and 98. Nelson further does not disclose the solid supports recited by new independent claims 90, 91, 99 and 100, which comprise linear compounds. For example, Nelson does not disclose a solid support which comprises a compound such as is recited by new claims 90 and 91, wherein one carbon atom (C₁), which is bound to an acyl group via an oxygen, sulfur, or nitrogen atom, is bound to a second carbon atom (C₂), which is bound to a hydroxyl group or protected hydroxyl group. Nelson further does not disclose a solid support which comprises a compound such as is recited by new claims 99 and 100, wherein one carbon atom (C₁), which is bound to an acyl group via an oxygen, sulfur, or nitrogen atom, is bound to a second carbon atom (C₂), which is bound to an oxygen atom which in turn is bound to a nucleotide or polynucleotide. For these reasons, Applicants respectfully submit that Nelson does not anticipate the invention now recited by claims 80-103.

The Rejections Under 35 U.S.C. §103(a) Have Been Obviated

As set forth on pages 8-10 of the Final Office Action, claims 48, 50-59, 62-65, 67-70, and 73-79 are rejected under 35 U.S.C. §103(a) as allegedly being obvious over Lyttle, while Vu and Nelson are deemed to be equivalents of Lyttle. Because Lyttle and Vu are unavailable as prior art for the reasons discussed above, this rejection is respectfully traversed to the extent relies it on Nelson and may be applied to any of new claims 80-103.

As described above, Nelson discloses a linear compound bound to a pore glass. Consequently, Nelson fails to even suggest a solid support which comprises a cyclic compound, much less the specific solid supports recited by new independent claims 80, 81, 97 and 98. And Nelson certainly does not suggest a solid support comprising a cyclic compound to which is bound a nucleotide or polynucleotide, such as is recited by new claims 97 and 98. Nelson further does not suggest the solid supports recited by new independent claims 90, 91, 99 and 100, which comprise a linear compound, and it certainly does not suggest a solid support comprising a compound to which is bound a nucleotide or polynucleotide, such as is recited by new claims 99 and 100. Indeed, Nelson teaches away from the solid supports of this invention by alleging that the compound it discloses “possesses a uniquely engineered linking arm” which offers several specific benefits. Nelson, page 1793, third full paragraph. Consequently, Nelson fails to even provide an incentive for those skilled in the art to alter the structure it discloses. For these reasons, Applicants respectfully submit that Nelson does not render obvious the invention now recited by claims 80-103.

Conclusion

In conclusion, it is believed that new claims 80-103 recite embodiments of the invention in a clear and definite manner. It is further believed that none of the references cited by the Examiner anticipate or render obvious the invention as claimed. Applicants thus respectfully submit that each ground for rejection has been successfully obviated and that the application is in condition for allowance. Should the Examiner deem it helpful, a personal or telephone interview is respectfully requested to discuss any remaining issues in an effort to expeditiously advance the application to allowance.

Applicants finally take note of the comment on pages 10-11 of the Final Office Action regarding the portion of the textbook authored by J. March (“March”), which was submitted with the Supplemental Amendment filed June 25, 1999. March was submitted as evidence that the functional language recited by claims 48-79 is acceptable. However, because claims 48-79 have been canceled and new claims 80-103 do not recite the bulk of the functional language objected to, Applicants believe that it is no longer helpful to cite March at this time. For this reason, March is not being resubmitted herewith.

No fees are believed to be due for the claim changes of this response. If any fees are due, however, please charge such fees to Pennie & Edmonds LLP Deposit Account No. 16-1150.

Respectfully submitted,

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Enclosure